

# Zero Retries issue 0040 2022-04-01

*Special Note* - For easier reading and reference, the content of Zero Retries 0039 (2022-03-25 - “Zero Retries Interesting” Projects and Systems - Part 1 of 2) and this issue were consolidated on a web page - [Zero Retries Projects Etc. from ZR 0039 and 0040](#).

Advanced Amateur Radio - Data Communications; Space; Microwave... the fun stuff! The Universal Purpose of Ham Radio is to have fun messing around with radios - Bob Witte K0NR. Ultimately, amateur radio must prove that it is useful for society - Dr. Karl Meinzer DJ4ZC. We are confronted by insurmountable opportunities! - Pogo. Nothing great has ever been accomplished without irrational exuberance - Tom Evslin. Irrational exuberance is pretty much the business model of Zero Retries Newsletter - Steve Stroh N8GNJ. What's life without whimsy? - Dr. Sheldon Cooper.

*Zero Retries is a unique, quirky little highly independent, opinionated, self-published newsletter about technological innovation in Amateur Radio, for a self-selecting niche audience, that's free (as in beer) to subscribe.*

About Zero Retries

## Steve Stroh N8GNJ, Editor

Jack Stroh, Late Night Assistant Editor Emeritus

### In this issue:

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- “Zero Retries Interesting” Projects and Systems - Part 1 of 2
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## Request To Send

Countdown to [Hamvention](#) 2022 - May 20-22, in Xenia, Ohio - 7 weeks...

It was fun to see what subjects (links clicked on) were most popular in Zero Retries 0039. The top 5 were:

- New Packet Radio mailing list

- Raspberry-Pi\_4\_Ham-Radio mailing list
- Digital Communications Conference (DCC)
- Digirig
- UHF-Satcom

I look forward to evolving this list every ten issues. As soon as I completed this issue, I began the draft of Zero Retries 0050. Because there's not much room for a project like this in a Substack email newsletter, the mentions in that next installment will necessarily be terse.

This list is but a smattering of just *how much technical innovation IS occurring* in Amateur Radio. And yet, you only read about a “smattering of this smattering” in the “Amateur Radio Publishing Industrial Complex”, and I don't just mean the two leading US Amateur Radio magazines. To a great extent, the Amateur Radio YouTube hosts are just as guilty of not showcasing the breadth of technological innovation that is occurring. It's maddening to see “innovation” reduced to the newest, shiniest HF radio, or portable, or ? To me, what is most encouraging about Amateur Radio innovation is the *totality* of the technological innovation that's occurring.

Regarding that lack of showcasing technical innovation in live media, I've seriously considered audio-only podcasting (I dabbled in proto-podcasting early in my writing career). I've concluded that if I'm going to venture out of my comfort zone of writing text into live media, it might as well be video rather than audio-only. *Perhaps...* it's time for me to create a YouTube channel? I've stumbled onto YouTube channels that are essentially a slideshow of photos with obvious text-to-speech audio narration; if a bot can do it, how hard can it be? 🤖

Zero Retries is just one voice in Amateur Radio, operating with no budget, with one writer. You'd think there would be more, and better funded such efforts. I agree that there should be.

de Steve N8GNJ

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## “Zero Retries Interesting” Projects and Systems - Part 1 of 2

This series began in Zero Retries 0039, with:

- Awards / Recognition
- Books
- Events
- Mailing Lists
- Modems / TNCs (Sans Radio)
- Media

- Networking
  - Organizations
  - Radios / Radio Systems (A - M)
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## **“Zero Retries Interesting” Projects and Systems - Part 2 of 2**

*This article should not be considered comprehensive, and lack of inclusion here should not be considered as lack of endorsement as “Zero Retries Interesting”. Much good stuff was not included simply due to limited space. Apologies in advance for terse / incomplete descriptions - see the links for detail.*

Many of these have been discussed previously in Zero Retries - just search:

Search Zero Retries

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### **Radios / Radio Systems (N - Z)**

[New Packet Radio / NPR-70](#) - “[From scratch](#)” data communications system for Amateur Radio for the 420-450 MHz band, with data rates up to 500 kbps. NPR was featured in an [IEEE article](#).

[Open IP over VHF / UHF](#) - A 100 kbps TCP/IP link on VHF / UHF frequencies, over at least 10 km, using software, Codec 2 modems, Software Defined Receivers, and Raspberry Pi computers (as transmitters). Installments: [1](#) [2](#) [3](#) [4](#) [5](#)

[RHIZOMATICA High-frequency Emergency and Rural Multimedia Exchange System \(HERMES\)](#) - (Amateur Radio adjacent) Innovative built-from-scratch system that uses High Frequency (HF) radio as a backbone for exchanging email in *very* rural areas.

[TAPR WSPR HATs](#) - The Raspberry Pi is capable enough that it can be configured in software to be a transmitter, most notably for [Weak Signal Propagation Reporter \(WSPR\)](#). These HATs for Raspberry Pi provide minor amplification and especially transmit filtering. This is an ideal beginner project for new Amateur Radio Operators - put your unit on the air and watch your signal [be heard around the world](#).

[Yaesu FTM-6000R](#) - Introduced in 2022; good 144-148 MHz / 440-450 MHz radio for data communications with a flat audio interface, 50 watts output.

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### **Satellite / Space**

[AMSAT-DL](#) - Germany is one of the most active “chapters” of AMSAT; one reason might be a strong relationship with the European Space Agency (ESA).

[Amateur Radio on the International Space \(ARISS\)](#) - Coordinates and funds the Amateur Radio systems onboard the ISS and arranges contacts between ISS astronauts and schools around the world; one of Amateur Radio's proudest boasts.

[Cubesat Simulator](#) - Amateur Radio satellites are a lot more interesting and relevant when you can see and touch (and interoperate with / monitor) a cubesat you can hold in your hand and "show and tell".

[Es'hail 2 / QO-100](#) - Amateur Radio payload on a Geosynchronous Earth Orbit (GEO) satellite above the Eastern Hemisphere.

[SatNOGS](#) - (Amateur Radio adjacent) Network of receive-only ground stations for receiving telemetry from research satellites (such as those built by schools); designed to be easy to build and operate, great project for Makers.

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## Software

[Build-A-Pi](#) - Utility to install a user-selectable suite of Amateur Radio software onto a Raspberry Pi.

[Dire Wolf](#) (Decoded Information from Radio Emissions for Windows Or Linux Fans) - Audio interface mode 1 highly capable packet radio "engine" taking maximum advantage of ample compute power.

[Fldigi](#) - Suite of audio interface "Fast, Light Digital Modes", actively maintained and well documented.

[G8BPQ Packet Radio](#) - Perhaps the most full-featured, capable BBS for Packet Radio, and the most capable "Net/ROM" router; actively maintained.

[HamPi](#) - 100+ Amateur Radio applications for use on a Raspberry Pi.

[KA9Q Radio Package](#) - "... demonstrates fast convolution and IP multicasting in a flexible multichannel software defined receiver that easily scales to hundreds of channels on low cost hardware".

[JNOS](#) - Sometimes called the "Swiss Army Knife" of Packet Radio, JNOS includes a packet node, BBS, email mailbox system, chat server (chatroom), and especially a Packet Radio to TCP/IP gateway. An interface to VARA FM was recently added.

[JS8Call](#) - Audio interface mode for chat / messaging mode leveraging the power of the WSJT-X capabilities.

[multimon-ng](#) - Audio interface modes that decode various obscure data modes, including POCSAG (paging).

[MultiPSK](#) - *Many* audio interface modes (some I've never heard of).

[PiGate](#) - Automated gateway between public users (Wi-Fi, web form) and Winlink email such as when doing communications in a mass casualty shelter.

[PiStar](#) - “Software image for the Raspberry Pi to provide the complex services and configuration for Digial Voice on Amateur radio in a way that makes it easily accessible to anyone just starting out.”

[QT Soundmodem \(QtSM\)](#) - Audio interface modes; multi-platform port of [UZ7HO's SoundModem](#) packet radio “engine”.

[TARPN Networking](#) - In addition to the NinoTNC, TARPN has customized a suite of existing packet radio networking software for Raspberry Pi that includes BBS and chat.

[VARA FM](#) - Audio interface mode; remarkable achievement that when used with a VHF / UHF radio that has a flat audio input / output and a high performance audio interface (such as the Masters Communications DRA series) achieves robust connections of up to 25 kbps on a standard 20 kHz VHF / UHF channel.

[WSJT-X](#) - Amazing audio interface modes that work far below noise thresholds.

[Xastir](#) - APRS client, ported to Windows, Mac, and Linux; actively maintained.

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## **Software Defined (SD) Radio / Receivers / Transceivers**

[ADALM Pluto](#) - (Amateur Radio adjacent) Entry level SD Transceiver, reasonably priced.

[Airspy \(US\)](#) - SD Receivers, optimized for HF; US distributor has a wider selection of accessories than parent (UK).

[CaribouLite RPi HAT](#) - (Amateur Radio adjacent) SD Transceiver for Raspberry Pi Zero / Zero W / Zero 2 W.

[Dragon OS](#) - (Amateur Radio adjacent) “Out-of-the-box Lubuntu 20.04 based x86\_64 operating system for anyone interested in software defined radios.”

[GNU Radio](#) - (Amateur Radio adjacent) If you can't do it with a SD Transceiver and GNU Radio (software), it may not be possible.

[HAMNET Access Protocol \(HNAP\)](#) - (As I understand it...) Turnkey software image for data communications on 420-450 MHz using ADALM Pluto Software Defined Transceivers. We need a lot more of these practical examples of Software Defined Radio technology.

[KrakenSDR](#) - (Amateur Radio adjacent) 5 phase-coherent SD Receivers in one unit, designed for tasks like time-of-arrival triangulation. Individual receivers can be configured for adjacent bands.

[Lime SDR](#) - (Amateur Radio adjacent) SD Transceiver - “Big Sister” (more capable than) the Lime SDR Mini (see below).

[Lime SDR Mini 2.0](#) - (Amateur Radio adjacent) This is one of the more capable, entry level SD Transceivers and was popular enough to redesign when critical parts became unavailable.

[LimeRFE](#) - Companion unit for Lime SDR / Lime SDR Mini - driver amplifier / filter for Amateur Radio HF / VHF / UHF / Microwave bands.

[rpitx](#) - (Amateur Radio adjacent) “General radio frequency transmitter for Raspberry Pi which doesn't require any other hardware...”

[RPX-100](#) - SD Transceiver for 50-54 / 144-148 / 420-450 MHz at usable transmit power levels.

[RTL-SDR](#) - (Amateur Radio adjacent) Company that popularized “SD receiver dongle”; impressive performance for the price; widely cloned so pay careful attention to their authorized sales channel.

[SDRplay RSP1A](#) - SD Receivers with good performance, supported by their own Windows software (but with other SDR software).

[YARD Stick One](#) - (Amateur Radio adjacent) Hard to get a simpler SD transceiver than this one.

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## Special Mention / Unique Category

[Laurel Volunteer Examination Coordinator \(VEC\)](#) - Low overhead, no cost Amateur Radio license exams; the 21st century method of doing Amateur Radio testing.

[RadioID.net](#) - Worldwide, unified management of unique ID numbers for Amateur Radio use of Digital Mobile Radio (DMR).

[Starlink](#) - (Amateur Radio adjacent) In my opinion, the best, most stable Internet access. Relatively immune to local Internet outages such as damage to fiber, power outages, etc. If you want to provide backup communications in your community / neighborhood, Winlink, APRS-IS, etc. , Starlink is ideal.

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## Submit *Your* Ideas for “Zero Retries Interesting”

Nominations for the next edition of this list in Zero Retries 0050 (approximately mid-June, 2022) are welcome! To avoid losing good ideas (you wouldn't believe my email...), please go to [this form](#) to submit your suggestion.

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## Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, check out **Join the Fun on Amateur Radio** for some pointers.

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## Closing the Channel

- In its mission to highlight technological innovation in Amateur Radio, grow Amateur Radio, and make it more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to anyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex!
- My ongoing Thanks to Tina Stroh KD7WSF for, well, *everything* and Bill Vodall W7NWP as *Zero Retries Instigator in Chief*.
- My ongoing Thanks to pseudostaffers [Dan Romanchik KB6NU](#) and [Jeff Davis KE9V](#) for continuing to spot, and write about “Zero Retries Interesting” items on their respective blogs that I don’t spot on my own.
- [Southgate Amateur Radio News](#) consistently surfaces “Zero Retries Interesting” stories.
- The [Substack email publishing platform](#) makes Zero Retries possible. I recommend it for publishing newsletters.

**Substack has an IOS App!** If you read Zero Retries on an **iPad** or **iPhone**, the [Substack Reader app](#) might be a [more pleasant reading experience](#) than email, web, or RSS. An Android app is apparently coming soon - [sign up](#) to learn when it’s ready.

If you see something interesting mentioned in Zero Retries and would like to search all the Zero Retries “Back Issues”, that’s now easy - just click:

Search Zero Retries

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Offering **feedback or comments** for Zero Retries is equally easy; yes, you guessed it... just click:

Leave a comment

Email issues of Zero Retries are “instrumented” by [Substack](#) to gather basic statistics about

opens, clicking links, etc. I don't use such information in any way other than seeing that most subscribers actually do read Zero Retries.

All previous issues of Zero Retries are available without restriction (no paywalls). For some background, Zero Retries 0000 was the **Introduction Issue**. Zero Retries 0026 and Zero Retries 0027 were a **2021 Year End Review** of Zero Retries. Every "decade" issue of Zero Retries is an overview of "Zero Retries Interesting" projects, etc.

More bits from Steve Stroh N8GNJ:

- [SuperPacket blog](#) - *Discussing new generations of Amateur Radio Data Communications - beyond Packet Radio (a precursor to Zero Retries)*
- [N8GNJ blog](#) - *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs - Bellingham, Washington, USA*

Thanks for reading!

Steve Stroh N8GNJ / WRPS598 (He / Him / His)

These bits were handcrafted in beautiful Bellingham, Washington, USA

2022-04-01

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1

Formerly called "Sound Card" modes, but that descriptor is an anachronism given that "Sound Cards" are no longer used. Thus, "Audio Interface" is used.